

### **Problem Solving Through Discrete Mathematics**

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Project Description: Valparaiso University and the School City of East Chicago have formed a partnership in order to increase the content knowledge and improve the teaching methods of mathematics teachers in the School City of East Chicago. The project is three years in duration and will provide high-quality, standards-based professional development and on-going support to two cohorts of 30 K-9 mathematics teachers. Each cohort will participate in 20 training days that include two eight-day summer workshops and four school-year follow-up sessions. A total of 60 teachers will be involved in the program.

Project Partners: Valparaiso University and the School City of East Chicago

#### ***Valparaiso University***

VU provides professional development along with the course materials. VU provides an on-site library, appropriate technology and resource material for use in the classroom.

#### ***School City of East Chicago***

The SCEC recruits participants, provides release time to teachers, and collects and analyzes data for the evaluation process. SCEC is the fiscal agent for the grant.

Goals:

1. Increase content knowledge of participants;
2. Model sound pedagogy and teaching techniques that are especially useful in mathematics education;
3. Develop standard-based lessons linked to the curriculum and focused on problem solving.

Achievements:

- Twenty-two teachers attended the first summer workshop and showed up for the first follow-up session. The teachers were very satisfied with the program at the end of the summer. During the fall follow-up session they reflected on the changes in their classroom practices, you can read some of the comments below.
- During the summer workshop teachers developed standard based lesson plans. As part of the graduate course requirement teachers implemented discrete mathematics units in their classroom. Some of the participants have already shared their experience during the follow-up session Every presentation demonstrated successful classroom implementation of discrete math topics.
- One teacher held a demonstration at his school about the workshop and as a result we already have 5 applications for next summer without any recruiting effort.

### **Initiative for Schools, Industries and the Sciences for Elementary Teachers (ISIS-ET)**

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Project Description: Valparaiso University, the School City of East Chicago, and the Challenger Learning Center of Northwest Indiana have formed a partnership to plan and implement the Initiative for Schools, Industries and the Sciences for Elementary Teachers (ISIS–ET). The project is three years in duration and will provide high-quality, standards-based professional development and on-going support to two cohorts of 20 K-6 teachers. Each cohort will participate in 15 training days (116 hours) that includes one ten-day summer institute, two school-year follow-up sessions, and one three-day follow-up summer session. Follow-up activities will also include in-service training days for 15 additional elementary teachers each school year. These in-service days will extend the project beyond the two cohorts of teachers. A total of 70 teachers will be involved in the program.

Project Partners: Valparaiso University, the School City of East Chicago and the Challenger Learning Center of Northwest Indiana

#### ***Valparaiso University***

VU provides professional development along with the course materials. VU delivers equipment to SCEC teachers and provides technical and instructional support in their classrooms.

#### ***School City of East Chicago***

The SCEC recruits participants, provides release time to teachers, and collects and analyzes data for the evaluation process. SCEC is the fiscal agent for the grant.

#### ***Challenger Learning Center of Northwest Indiana (CLC)***

The CLC provides training using a multi-disciplinary approach emphasizing educational content, cooperative learning, problem solving and responsible decision-making.

Goals:

1. Enhance their content knowledge in science
2. Improve their skills in using inquiry based learning approaches that incorporate sophisticated technology in teaching science
3. Ensure their use of Indiana's academic standards and curriculum frameworks to improve instructional practices and student achievement.

**Achievements:**

- Sixteen teachers attended the first summer workshop held on July 19 to July 30, 2004. Based on the program evaluations, the program was a tremendous success.
- As part of the program, all teachers were required to develop interdisciplinary inquiry based projects to fulfill the graduate course requirements. The teachers are also expected to implement these projects during the current school year.
- The ISIS interactive website has also been modified to include activity particularly for this program.

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**Vigo County Mathematics Initiatives**

Project Description: The plan for this project in year one is to have the lead teacher, the professor from I.U., the corporation curriculum coordinator for math and the principals involved meet and discuss implementation. After the plan has been finalized, it would be presented to the teachers at the three schools. These teachers would be invited to participate in a summer workshop led by the I.U. professor who would be assisted by the lead teacher. Before school starts in the fall of 2005, feedback from the summer workshop would be examined, and follow-up would be designed. Also the Indiana Math Initiative representative would present and explain ACT (Advancing Children's Thinking) Framework for classroom observation to the lead teacher. During the school year, the lead teacher would model lessons, engage in peer dialogue and coaching, maintain online accessibility, keep a reflective log and meet with principals and the curriculum coordinator to discuss observations, progress, concerns and revisions. At least three times during the school year, the principals, the Deputy Superintendent, curriculum coordinator and independent evaluators will meet to plan leadership development sessions. Principals will evaluate the summer workshop participants using the ACT framework during the school year. I.M.I. will provide intensive training in content, pedagogy and leadership for the lead teacher in the fall of 2005. The lead teacher, principals and curriculum coordinator will evaluate fall 2005 ISTEP+ results as well as norm-referenced scores to determine areas of need within those three buildings. Middle school teachers will meet with the lead teacher and the I.U. professor on at least four Saturdays during the school year as follow up to the summer session. Finally, evaluators will examine the program in May of 2006 to judge effectiveness and offer revisions for year two.

Project Partners: Vigo County School Corporation, Indiana Math Initiative, Indiana University, and Indiana State University

***Vigo County School***

Coordination and participation

***Indiana Math Initiative***

Training

***Indiana University***

Training

***Indiana State University***

Evaluation

**Goals:**

1. Students will increase mathematics achievement resulting in a yearly increase in the percentage of students passing ISTEP+ in grade eight mathematics in three high-need middle schools.
2. Teachers of middle school mathematics in three high-need middle schools will deepen their understanding of both content and research-based instructional strategies in mathematics.
3. One highly-qualified, well-trained lead teacher will model exemplary lessons aligned to Indiana Academic Standards of Mathematics for teachers of middle school mathematics in three high-need schools.

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**Reach for the Numbers**

Project Description: Reach for the numbers is a mathematics initiative that will annually impact approximately 440 English Language Learners in K-9 to achieve academic English proficiency within the context of mathematics. Initially, 16 teachers will learn and implement hands-on scientifically based instructional strategies particularly in the areas of number sense, algebra/functions, measurement and problem solving. Teachers will attend a two-week summer institute in August 2004 conducted by the Departments of Mathematics and Education of St. Mary's College. During the school year, Saint Mary's College staff will provide on-site job-embedded coaching and support based upon teachers' needs. Monthly classroom visits and monthly meetings will be conducted with teachers for teacher reflection.

Project Partners: South Bend Community School Corporation and St. Mary's College Partnership

Goals:

1. Teachers will implement scientifically research-based instructional strategies that will increase student academic achievement among English Language Learners (ELL) in mathematics and English language proficiency with the context of mathematics.
2. ELL students' math scores will improve on ISTEP+ tests.
3. ELL teachers' intellectual growth will be stimulated and their math knowledge and skills will be updated.

Achievements:

- Having Saint Mary's College personnel from the Department of Mathematics and Education giving various presentations during the summer institute gives better perspectives on math, learning content, application, and teaching methodologies.

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#### **M4: Making Math More Meaningful**

Project Description: This program gives opportunities to increase math teachers' skills and knowledge of math, to develop number sense and algebraic thinking activities to implement in classroom and create cohesive and coherent math program to help students improve math performances. Interventions include summer and in-service professional development sessions and follow-up programs during the school year for all classroom teachers of mathematics K-12 in the school district as well as special education teachers.

Project Partners: Purdue University and Crawfordsville School Corporation

##### ***Purdue University***

Increase number of professional development interactions with professionals by 10% a year. Provide staff development on SBRR methods that teach and model thinking and problem solving with emphasis on algebraic thinking and number sense.

##### ***Crawfordsville School Corporation***

Classroom teachers of mathematics K-12 will participate in professional development to enhance their understanding of problem solving and algebraic thinking. Administrative staff will implement and direct programs and expenditures.

Goals:

1. Formal partnership with Purdue University School Mathematics & Science Center (SMSC)
2. All math teachers will participate in professional development to upgrade their math knowledge and skills.
3. All students will develop a foundation of algebraic thinking and numbers sense in solving complex math problems.

Achievements:

- In this first year of professional development we had overwhelming participation from elementary (K-5) staff. All classroom teachers were involved in some way in learning about the new math curriculum program.
- Fifty-two teachers participated in an intensive 2-day workshop. Of those, 18 continued to be involved in the 2-week lab school program where they taught a summer school class for a day and worked with colleagues for planning, reflection and learning for the remainder of the day.

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#### **Partnership to Ensure Success in Mathematics**

Project Description: The project is focused on improving students' achievement in mathematics. Professional development for K-9 teachers of mathematics will be provided during summers 2004-2006 and evenings during the school year. Teachers will participate in classroom experiences designed to increase and broaden their knowledge of mathematics content, assessment in mathematics and instructional strategies. A combination of horizontal and vertical collaboration among classroom teachers, school administrators, university mathematics faculty, and university education faculty, will facilitate growth in mathematics instruction in the classroom. The use of professional meetings, classroom observations, video tape analysis, and modeling will define the structure of the professional development.

A cadre of lead teachers will receive additional instruction to provide continuity at the completion of the grant. Additional intense preparation in mathematics content and mentoring will provide the lead teachers the skills to work effectively with the K-9 teachers of mathematics. The lead teachers will progressively assume leadership in planning and executing the initiatives of the grant.

Project Partners: Clarksville Community School Corporation, St. Anthony's School and Indiana University Southeast

**Clarksville Community School Corporation**

Coordination/Participation

**St. Anthony's School**

Participation

**Indiana University Southeast**

Training

Goals:

1. Increase the percentage of students passing ISTEP+
2. Align math curriculum to IN State Standards
3. Utilize alternative assessments

Achievements:

- Excellent participation and involvement from all participating teachers.
- This is a great opportunity to expose and expand all teachers of mathematics, K-9 and special education, to effective teaching strategies.
- We are also excited about the identification and training of "lead teachers" who will also become mentor certified as a result of this program.

### **Science Training Actively Reaches Students (STARS)**

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Project Description: The Science Training Actively Reaches Students (STARS) program focuses on professional development of Southwestern Elementary School staff in the area of inquiry-based science. The avenues of professional development include summer institutes in collaboration with the Division of Science and the Department of Education at Hanover College as well as a teacher-led science laboratory where inquiry-based instruction would be modeled for the classroom teachers. Thirty-eight general education classroom teachers are participating in this program.

Project Partners: Southwestern Elementary and Hanover College

**Southwestern Elementary**

Participate in inquiry-based science training through summer institutes and weekly science lab, assist with creating the science curriculum.

**Hanover College**

Serve as mentors and resources for understanding content and inquiry-based laboratory methodologies. Guide the summer institute sessions.

Goals:

1. Create opportunities for professional development of staff in the area of science.
2. Establish an active collegiate partnership with the Division of Science and Mathematics and the Department of Education at Hanover College.
3. Enhance current science instructional time and resources.

Project Description: Scientific Modeling for the Inquiring Teacher Network (SMIT'N) is a three-year program serving 24 K-6 teachers in a sustained professional development program using a combination of summer institutes, school year workshops, and classroom support. The program was designed in collaboration with partners from the Monroe County Community School Corporation, Indiana University biology department, and Indiana University Science Education Program. These partners have designed a program that uses scientific modeling to enhance teachers' and students' understandings. This program seeks to improve K-6:

- teachers' understandings of and abilities to teach using scientific inquiry and the learning cycle
- teachers' abilities to teach problem-solving process skills including observing, questioning, hypothesizing, predicting, collecting, analyzing data, and forming conclusions as described by the Indiana Academic Standards.
- teachers' understandings of and abilities to teach nature of science (NOS)
- teachers' abilities to teach life science concepts using scientific modeling
- teachers' understandings of life science content knowledge as required by the Indiana Academic Standards
- students' understandings of life science content knowledge as described by the Indiana Academic Standards

A key component of the program includes on-site pedagogy and content classroom support from biology and science education specialists. Teachers also reflect on their instruction and provide peer feedback through classroom videos of their instruction, and provide instructional support to other non-participating teachers.

Project Partners: Monroe County Community School Corporation (MCCSC); Indiana University College of Arts and Sciences: Biology, Indiana University; School of Education: Science Education. Jean Schick from MCCSC identifies and recruits teacher participants. She supports teachers in participating in the program and serves as a liaison between the school district and IU. Jose Bonner of Biology identifies biology content graduate students to provide classroom support to teachers. Valarie Akerson of Science Education coordinates the program, provides pedagogy instruction, and identifies science education graduate students to provide classroom support to teachers.

Goals: Improve teacher understandings of and abilities to teach using scientific inquiry and the learning cycle.

Improve teacher abilities to teach problem-solving process skills.

Improve K-6 students' understandings of life science content knowledge.

Achievements: A group of fifteen teachers from the Monroe County Community School Corporation (MCCSC) is concluding a two week course this week that's part of a three-year professional development program for science teachers from kindergarten through 6th grade. The Scientific Modeling for Inquiring Teacher Network, or SMIT'N, is a grant-funded project of the Indiana University School of Education in collaboration with the IU biology department and MCCSC. Aside from the summer program, the teachers have taken part in school-year workshops and received materials and classroom support in terms of providing instruction as well as feedback.

The workshops have focused on teachers' use of scientific inquiry teaching strategies to improve student learning. Project director Valarie Akerson said she is using scientific modeling methods that she hopes teachers can take back to their own classrooms. While the first two summer sessions explored what inquiry is and how to teach it to students, this summer is focused on how the teachers use language in their instruction. This session will help teachers refine strategies to better meet their goals for student learning.

### **Improving Inquiry and Standards-Based Elementary Science Instruction Partnership**

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Project Description: The purpose of the Improving Inquiry and Standards-Based Elementary Science Instruction Partnership is to improve the quality of science education provided by elementary teachers and to develop

scientific literacy in all students. A two-week summer workshop, based on the results of the needs assessment, will involve teachers in professional development activities consisting of:

- Inquiry-based instruction and Indiana's Academic Standards for Science;
- Interdisciplinary activities and instruction techniques that address individual student learning needs;
- Activities and information to develop content knowledge;
- Time to create, implement, and assess science lessons.

The teachers will implement inquiry-based lessons with students who come for five half days during the summer workshop, and use what they have learned in their classes during the school year. Each participating teacher will work on three projects that will be part of the evaluation plan: the employment of a series of inquiry-based lessons, the creation of a teacher portfolio for science, and a group presentation at the HASTI annual conference. Teachers who participate in the first summer institute will serve as peer-mentors. Release time will be given to teachers so that they may assist each other and attend workshops during the school year. The university partner will make weekly visits to Frankfort and conduct four follow-up sessions during the school year based on ongoing needs assessments.

Project Partners: Community Schools of Frankfort and Purdue University

Through this partnership, Purdue University College of Science will provide professional development for elementary teachers leading to:

- Increased knowledge of science content, science process, and academic standards.
- An understanding of pedagogical practices targeting authentic inquiry-based science activities and assessment that informs teaching and learning.
- Effective utilization of varied teaching resources including technology
- Classroom-ready materials and standards-based curricula
- Leadership development and peer-mentor training.

Data collection, teacher recruitment, evaluation, and preparation of reports will be a collaborative effort of Frankfort and Purdue. The Community Schools of Frankfort will support teachers by providing release time for professional development, registration fees to attend workshops, and stipends for work done outside of regular school commitments. Each participating teacher will implement inquiry-based lessons, create a teacher portfolio for science, and participate in a group presentation at the Hoosier Association of Science Teachers, Inc. (HASTI) annual conference.

Goals:

1. To improve the quality of science education provided by elementary teachers.
2. To increase participation in content-based professional development and the science content knowledge of elementary teachers who teach science.
3. To improve the inquiry and problem solving teaching skills of elementary teachers. To develop scientific literacy in all students.
4. To increase the number of students participating in classes with teachers using inquiry and problem solving teaching skills.
5. To increase the elementary student achievement on the ISTEP science assessment.

Project Description: Promote inquiry-based/learning cycle approaches to K-6 science teaching that involve scientific methods of reasoning and problem solving (observing, questioning, hypothesizing, predicting, collecting, analyzing data and forming conclusions).

Project Partners: Elkhart Community Schools, Purdue University and ETHOS Partnership

### ***Purdue University***

Approval of course content, oversight of teacher training, program evaluation

### ***ETHOS***

Develop course content for each year, Serve as training staff and support group, Serve as facility and materials resource, Provide integration methods for math and language arts, Provide additional science educational opportunities

Goals:

1. Encourage professional development efforts that bring K-6 science teachers together with field scientists and engineers from Bayer, Inc. and other industry professionals such as higher education science instructors from Purdue University.
2. Impact K-6 science teachers to become more knowledgeable concerning science content and hands-on inquiry based methods of instruction.
3. The professional development activities and the change in student performance will be measurable, ambitious, and realistic.

Achievements:

Two major community events were designed to help promote interest in science. The first was Science Spooktacular that was a collaboration of scientists and engineers from Bayer Corp and the American Chemical Society joining forces with local teachers, ETHOS staff and professors and students from Purdue, Notre Dame and St Mary's. This event hosted over 1000 attendees and allowed the opportunity for teachers to interact and learn a diverse set of science activities that they could include in their classroom instructions.

The second was Science Night that included area teachers, Montessori School staff, and many scientists/engineers from community businesses that engaged over 200 attendees to many new hands on science activities.

Another experience was the in depth instruction from Purdue professors, Dr. Jerry Krockover and Dr. Dan Shepardson for the Elkhart Community School Science Liaison's that was provided for by the MSP grant.

- K-6 teachers have been immersed in variety of eight workshops involving science content and process designed specifically for their class curriculum.
- Week long inquiry classes have teachers exploring ways to create an environment within the classroom that is conducive to inquiry-based education which is based on the FERA learning cycle (Focus, Explore, Reflect, Apply)
- Liaisons are guided through the development of designing performance based assessment tools as they apply to measuring student achievement of content and critical thinking skills.

The Master Science Teachers conduct on site visits, model science teaching sessions and provide support directly or via e-mail and phone to encourage all K-6 teachers in the district who are teaching science.

Professional development activities have produced over 70 extended lessons plans of the current adopted curriculum. Some of these are already available on the ETHOS web site and more will be added later

Project Description: Teacher and curriculum leaders in the Metropolitan School District of Washington township in partnership with IUPUI engineering and technology departments have designed training of K- 9 teachers on best practices in mathematics instruction, real world applications of mathematical concepts, and interactive standard based lessons for students. In addition participants engaged in a weeklong academy, and will participate in online forums, book studies and lesson studies throughout the school year

Project Partners: IUPUI and Washington Township Schools Partnership

Goals:

- All teachers participating in the program will increase their knowledge in problem solving, communicating and reasoning mathematically, algebraic thinking, and number sense as measured by pre- and –post assessments.
- All teachers participating in the program will increase their knowledge and understanding of how students learn by focusing on research – based best practices of teaching as measured by observable classroom practices and students’ demonstration of their understanding of mathematical concepts.
- All teachers participating in the program, in conjunction with IUPUI partners, will learn to develop and create mathematical task, activities, and applications connected to the real world that are developmentally appropriate and standard based.

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### **Passport to Science**

Project Description: The Passport to Science program develops a pilot in three (3) diverse elementary buildings designed to produce a model of elementary professional development in science content, pedagogy and content pedagogy for teachers in the forty-nine IPS elementary buildings. Teachers will participate in summer professional development, implement model lessons and work independently with a science coach and university partners to align their skills and content knowledge with inquiry learning strategies and the Indiana State Science Standards of 2000. Model investigative lessons will be developed for each grade level.

Project Partners: Ball State University and IPS

#### ***Ball State University***

University partners will engage in one or more of the following: speaking at buildings, being a part of an “Ask the Scientist” e-mail network, providing distance learning or Polycom - enabled content enhancement activities, providing shadowing experiences for IPS teachers, suggesting lessons content, writing exemplars and rubrics or assisting with lesson implementation. Ten (10) Ball State University staff will be engaged.

Goals:

1. Creation of standards aligned lessons that increase student performance will be identified for each grade level K-6. A total of 105 lessons will be developed.
2. Students will engage in high quality science lessons in 95% of the classrooms in the program.
3. Administrators and a science team of teachers from 100% of the engaged buildings will participate in long term planning and implement the plan.

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### **Establishing a Culture of Inquiry: Expanding the Science Knowledge Base of Southern Indiana Elementary Teachers**

Project Description: Cannelton City Schools is the fiscal agent for the Southern Indiana Education Center consortium. Coupled with the fiscal agent and SIEC are eight (low-performing in science) rural public elementary schools, the Indiana University science department, one science engineer, two outside evaluators, one special education co-op teacher, one business partner and school communities. They will unite to institute a quality system throughout the region that will ensure that teachers significantly improve their knowledge of science and best practices of teaching science with resulting improvement (proficient or advanced scoring on ISTEP) of science



achievement for children in grades K-6. The system will be formed as a networking support for science teachers and improved elementary science programs. It will be based on NSTA recommendations, the National Science Standards and the IDOE Science Standards. Each of the goals directly relate to improved teaching and learning of science for students in grades K-6. The teachers and university partners/engineers will work together at bimonthly training seminars, two nine-day summer institute sessions, online forums, bimonthly online newsletters, and two-way video communications. All sessions will be filmed, edited, archived, and distributed in DVD format. Outside evaluators will “condition” participants to collect and review evaluative measures of their work and results in the classroom with the Survey of Enacted Curriculum data as an evaluation focus tool coupled with multiple measures of assessment.

Goals:

- To expand the content knowledge of elementary science teachers.
- To establish a southern regional professional learning community for the promotion of the exchange of ideas and methods for the improvement of teaching and learning science
- To ensure best practices in elementary science teaching and learning so that student achievement is proficient at or above science ISTEP passing scores
- To provide inquiry-based professional learning modules that give the teachers science content packaged in rigorous and relevant units

Achievements:

The Summer Institute had 70+ participants. We focused on the Science Standards Four (The Living Environment) and Three (The Physical Setting). Diane Paynter of Marzano and Associates presented the research-based background needed for every subject area for successful teaching and learning. Jose Bonner, Molecular Biologist from Indiana University was a dynamic presenter of content and strategies of the important scientific process. Professional books and materials were reviewed for content understanding and application in the classroom. Thorough “unpacking” of the benchmarks in the science standards were learned by all. Archives in DVD digital video photography helps to sustain and keep alive the journey to success as science teachers.

### **Enhancing Elementary Teachers’ Knowledge and Skills for Teaching Inquiry-Based Science**

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Project Description: Science teachers from Gary Community School Corporation in collaboration with faculty at Purdue University join forces to facilitate a three year integrated, intensive professional development program aimed at enhancing teachers’ knowledge and skills for teaching inquiry-based science.

Project activities include a series of classroom- and standards-based summer courses where teachers engage in authentic, inquiry-based experiences in life, physical, and geo-science. Summer courses are supplemented by field-based investigations with local area science professionals including law enforcement authorities affiliated with crime lab analysis. Teachers will develop and implement inquiry-based lessons while engaging in reflective practice on their attempts at enhancing inquiry-based/learning cycle approaches. Academic year sessions include teachers’ engagement in additional content- and inquiry-based professional development, a collaborative action research network, on line discussions, and conference presentations. Sustainability efforts include training of teacher leaders, development of a project website, and a bank of inquiry-base science tools and resources.

Project Partners: The partners in this professional development initiative include: Elementary schools in the Gary Community School Corporation (GCSC), Purdue University Department of Physics and Purdue University Department of Curriculum and Instruction.

### ***Gary Community School Corporation***

- Co-planning summer courses and academic year activities;
- Providing teacher leaders who will serve as science inquiry coaches;
- Providing a venue for professional development activities;
- Contributing resource and curricular materials (i.e. existing science inquiry-based units, performance-based assessments, and district-adopted science kits); and
- Co-facilitating the collection and evaluation of student achievement and teacher effectiveness data.

### ***Purdue University***

- Co-planning summer courses and academic year activities;
- Providing science and science education faculty for professional development instruction in inquiry-based science content and pedagogy;
- Providing a venue for professional development activities;
- Contributing resource and curricular materials;
- Co-facilitating the collection and evaluation of student achievement and teacher effectiveness data; and
- Assigning and collaborating with an external project evaluator.

Goals: The overarching goal of this project is to promote inquiry-based, learning cycle approaches to K-6 science teaching that involve the scientific processes of reasoning and problem solving (including skills such as observing, questioning, hypothesizing, predicting, collecting & analyzing data, and forming conclusions).

The specific objectives include:

1. Enhance teachers' science content knowledge beyond the level that they are expected to teach;
2. Increase teachers' knowledge and practice of scientifically based research pedagogical methods and technology-based teaching strategies;
3. Establish and sustain a bridge between professionals with science practitioners;
4. Enhance teachers' capacity to be reflective practitioners.

Achievements: We had a successful and enjoyable professional development workshop in June 2006. Ten enthusiastic GCSC teachers participated in a 2 week series of authentic, inquiry-based, and standards-based activities involving physics, life science, and environmental science. Pedagogical discussions about inquiry-based teaching and learning, productive questioning, and lesson planning were woven into our instruction. In addition to activities at Purdue University, teachers engaged in two community-based experiences. On Friday, June 16, as part of a week-long "crime scene investigation" unit, we visited the Gary CSI team whose presentation to the teachers included topics such as crime scene management, evidence collection, courtroom presentation, and fingerprinting demonstrations. On Friday, June 23, as part of a week-long "science of gardening" unit, seven of the ten teachers saw a presentation about soil science at the Lake County Extension Office. We believe that by highlighting the science involved in the daily lives of science professionals, science teachers can begin to identify the connection between scientific inquiry in the classroom with scientific inquiry in the field. In the end, we hope these "community connections" will provide an opportunity for teachers from the Gary Community School Corporation to generate new ideas for future collaborations with members of Gary community and furthermore, enhance children's engagement in science through real world applications. Finally, each teacher wrote two lesson plans that we have encouraged them to implement in their classroom in the upcoming academic year. During the follow-up seminars, we will seek updates regarding teachers' progress and experiences implementing these lessons. In addition, we will ask them to write a reflection and provide evidence (e.g., evidence of student learning) of their lesson plan implementation.

### ***The Algebra Project***

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**Project Description:** The Algebra Project is a professional development effort that will provide a two-week summer institute and four days of follow-up training for forty, fifth through ninth grade teachers of algebra. A Lead Teacher model will be used so that each of the ten buildings involved in the project will have the benefit of an expert to model new strategies, to encourage teacher understanding and implementation of new methods, and to serve as a link between IU East and their respective buildings. Fayette County teachers will receive three graduate credits for attending Part I, held during years one and two of the grant project, and three additional credit hours for attending Part II during year three. Part II will be an advanced study of algebra content and methodology. Two IU East faculty members will provide instruction each summer so that elementary and secondary teachers can focus on their unique needs as identified through the needs assessment.

The goals of The Algebra Project are based upon a thorough needs assessment that included a written content and methodology test that was administered to all grade five through nine teachers, written surveys and teacher interviews. The results showed a need for a course focused on the fundamentals of algebra for elementary teachers with a more advance focus for secondary teachers. All teachers will learn how both technology and manipulatives can be utilized to support a variety of instructional strategies. [Click here for project photos](#)

**Project Partners:** Fayette County School Corporation in Connorsville and Indiana University East in Richmond. FCSC (FCSC) and Indiana University East (IU East) have successfully partnered during inservice and preservice opportunities for many years, including a recent Summer Science Institute through IU East and preservice field experience placements through Fayette County. The Algebra Project provides the opportunity for a long-term partnership that will benefit both institutions. Teachers in grades five through nine will receive professional development from the IU East Mathematics Department and the School of Education to increase teacher understanding of the fundamentals of algebra and to provide research based strategies for teaching algebra to students. IU East preservice teachers will benefit from field experience placements with cooperating teachers involved in ongoing professional development. This has been a growing need in IU East programs. The university as a whole will benefit as incoming freshman students come to the university with better preparation in Algebra.

**Goals:** Teachers will solidify and enhance their knowledge surrounding the fundamentals of algebra. Teachers will learn how technology can be used to support a variety of instructional strategies. Teachers will develop skills encompassing inquiry based math instruction to include discovery, manipulatives, and constructivism. Student achievement in algebra will increase as teacher understanding of algebra content and methodology increases.

**Achievements:** Twenty-three 5th – 9th grade teachers received 3 graduate credit hours this summer after attending a two week summer institute with IU East. Teachers received 2 hours of content instruction from one professor, then rotated to receive 2 hours of methods from another professor. Teachers were grouped into secondary and elementary sections, however, holding the classes in the same building allowed for collaboration on some activities. One day was spent as a whole group as participants examine the standards above and below their grade level to determine power standards for their grade. For more information please visit the [E=MC2 Website](#)

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### **BCSC Inquiry Base Science Initiative**

**Project Description:** Pairs of teachers from each elementary school form the foundation of an inquiry-based instructional mentorship team. 2 additional teachers from each school are added to the network in subsequent years bringing the total to 66 mentors in the third year. The mentors meet monthly to work on curriculum alignment and integration, instructional design, and to review successes and failures of inquiry based instruction the previous month. Deliverables are created to, in turn, share at their buildings' monthly professional development sessions. Quarterly released time is provided to provide further support and opportunities to share ideas for the development of inquiry based lessons/units. Each summer the mentors participate in a two week workshop as well as two 2-day follow-up workshops during the school year. The focus of the workshops are teaching and learning science through inquiry based instruction.

**Project Partners:** IUPUC (Indiana University Purdue University Columbus), Bartholomew Consolidated School Corporation teachers and administrators. KidsCommons, Council for Youth Development. IUPUC Instructors from the Science, Technology, and Education Departments provide training and support for the mentors. The school

principals provide support for the implementation of inquiry based science. The mentors provide leadership and “coaching” in each of their buildings to promote inquiry based science.

Goals: To improve the quality of BCSC K-6 teachers’ science instruction utilizing a hands-on, inquiry-based approach.

- To increase BCSC K-6 teachers/ understanding of scientific concepts.
- To increase BCSC K-6 student mastery of the Indiana State Science Standards.
- To increase BCSC K-6 parents understanding and involvement in their child’s science education.

Achievements: Mentors have completed an integrated curriculum map for science. This will result in a greater focus on science as an integral part of the student learning environment. A second exciting event was the first Lego Robotics Competition locally. This was an outgrowth of summer training. A third positive accomplishment has been the significant increase of parent involvement through parent nights and science fairs/exhibits.

### **Muncie Community Schools’ Algebra Readiness Initiative**

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Project Description: The Muncie Community Schools’ (MCS) Algebra Readiness Initiative is a three-year professional development program that seeks to improve the efficacy of upper elementary and secondary mathematics teachers with respect to the teaching of algebra and algebraic reasoning. The proposed program is the result of a professional partnership formed with university faculty from the Department of Mathematical Sciences at Ball State University. Through this partnership, algebraic reasoning is introduced to teachers as a process in which students generalize mathematical ideas from a set of particular instances, establish those generalizations through the discourse of argumentation, and express them in increasingly formal and age-appropriate ways. The MCS Algebra Readiness Initiative utilizes the Concerns Based Adoption Model (CBAM) to measure the disposition of teachers toward the teaching of algebra and algebraic reasoning as a classroom practice. Specifically, this grant proposal seeks to move teachers along a continuum of concerns about the teaching of algebra and algebraic reasoning, ranging from an awareness level (i.e., little concern about or involvement with the need to teach algebra and algebraic reasoning is indicated) to the highest level of concern known as refocusing (i.e., the focus is on exploration of more universal benefits from the teaching of algebra and algebraic reasoning). The MCS Algebra Readiness Initiative utilizes the content area expertise of university faculty and the technical resources of Ball State University to provide long-term, sustained professional development to develop a cadre of teachers who understand the complexity of algebraic reasoning and how to integrate it in viable ways.

Project Partners: The Algebra Readiness Initiative is a project partnership between Muncie Community Schools and the Department of Mathematical Sciences at Ball State University.

### ***Muncie Community Schools***

MCS is serving as the fiscal agent for the grant. Additionally, the school district has formed an Algebra Readiness Advisory Council made up of teachers, administrators, and representatives from the BSU Mathematical Sciences Department to discuss the content and format of all workshop modules associated with the grant. This advisory council also is examining SoCQ data to monitor teacher readiness levels with respect to the teaching of algebra. The district provides classroom space for the workshop modules and, through the grant, a stipend is paid for teacher participation and resource materials.

### ***Ball State University***

The Department of Mathematical Sciences has partnered with MCS to provide a 3 hour course release to Dr. Sheryl Stump, Associate Professor, to serve as the official Project Partner to this grant. Other faculty members from the Mathematical Sciences Department that have assisted in facilitating course modules include Dr. Fred Jenkins, Dr. Bev Harter, and Dr. Kaye Roebuck. These university content specialists provide the district with a solid research-base for the content professional development activities associated with the project. They are also helping MCS to create an Institute for Math Leadership, whereby 28 MCS teachers will receive advanced training on the teaching of Algebra by examining content, pedagogy, and teacher leadership.

#### Goals:

- Over the next three years, 100% of MCS teachers will exhibit improved knowledge of algebra and algebraic reasoning as measured by documented instructional practices.
- Over the next three years, 100% of MCS teachers will demonstrate improved math pedagogy for algebra, including the ability to select appropriate supplemental materials that support academic standards.
- Goal #3: Over the next three years, 100% of MCS teachers will exhibit classroom practices that support the development of students' ability to reason algebraically as demonstrated through direct instructional observation.

#### Achievements:

- In October and November 2006 tools were modified and developed.
- Stages of Concern Questionnaire (SoCQ): This tool was developed and validated by the Southwest Educational Development Laboratory and is specific to teacher professional development. IYI acquired and studied the SoCQ handbook for use. IYI developed a print version of the tool for use by MCS, as well as a data entry template. In addition an ID system was created to help track teacher progression while maintaining anonymity.
- Workshop Survey: This tool was developed to gain insight into particular facets of impact and delivery of the professional development sessions. It provides feedback to the MCS trainers for improvement of workshop sessions. IYI developed a print version of the tool for use by MCS, as well as a data entry template.
- In November and December 2006 data was entered by MCS for both the SoCQ and the workshop survey.